

REMARKS

The Examiner provides a number of rejections and we list them here in the order in which they are addressed:

- I. Claims 1-20 are rejected under 35 U.S.C. § 112 ¶ 1 as the specification does not reasonably provide enablement for the device as claimed.
- II. Claims 1-20 are rejected under 35 U.S.C. § 112 ¶ 1 as containing subject matter which is not described to convey possession of the invention.

In the Advisory Action the Examiner noted that the "clean version" of the claims did not identify which claim had been amended and the number of times amendment had been made. If the Examiner is referring to Applicants' Appendix II, the Applicant wishes to remind the Examiner that 37 CFR § 1.121 (c)(3) does not require the submission of a full set of "clean" claims and provides no instruction to indicate claim amendment version(s):

(3) A clean version of the entire set of pending claims may be submitted in a single amendment paper. [emphasis added]

Contrary to the Examiner's assertion, the Applicants did indicate claim amendment version(s) in the "clean version" of the amended claims (*i.e.*, pg. 2; as per 37 CFR § 1.21(c)(1)(i)) and in the "marked-up" section of the amended claims (*i.e.*, Appendix I; as per 37 CFR § 1.21(c)(1)(ii)). Nonetheless, for the convenience of the Examiner, the Applicants have provided claim amendment version(s) in the discretionary full set of clean claims listed in Appendix II of this Preliminary Amendment.

I. The Claims Are Enabled

The Examiner states that "... the specification ... does not reasonably provide enablement for a device where it is manufactured out of quartz or glass." *Office Action* pg 2. The Examiner proceeds to construct an argument, based on out-of-context quotations from the Applicants' specification, to assert that the presence of silicon is allegedly required for the etching of microdroplet transport channels and production of heating elements. The Applicants' disagree and argue that the specification as filed clearly describes the etching

process used for glass (and quartz). Additionally, the Applicants rely on the arguments presented in the prior response.

The Examiner has apparently overlooked the Applicants' specification describing etching of a "glass wafer" on pg 17 ln 27 - pg 20 ln 3. Etching methods for quartz and glass are clearly enabled in this section of the specification by stating they are well known in the art at the time of the invention.

For example;

In a preferred embodiment, channels were prepared on 500 μm thick **glass wafers** (Dow Corning 7740) using standard aqueous-based etched procedures. [...] The accessible **glass was then etched** in a solution of hydrofluoric acid and water (1:1 v/v). ... the final etch typically giving channel depths of 20 to 30 μm . *Applicants' Specification pg 17 ln 27 - pg 18 ln 6. [emphasis added]*

In the prior response, it was clearly shown that the Applicants' contemplated constructing a complete device out of either quartz or glass. Secondly, the Examiner is reminded that both glass and quartz COMPRISE the element of silicon and therefore fall within the scope of the Applicants' written description.

Nonetheless, without acquiescing to the Examiners' argument but to further the prosecution, and hereby expressly reserving the right to prosecute the original (or similar) claims, Applicants have amended Claims 1 and 8 to clearly recite the presence of silicon in construction of both the microdroplet transport channels and the heating elements.

Furthermore, the Examiner is requested to note that the Applicants have *sua sponte* corrected a lack of antecedent basis in claims 6 and 18 by amending the term "fluid" to "microdroplet" in claims 1 and 13.

The Applicants, therefore, respectfully request the Examiner to withdraw the rejection.

II. The Applicants Had Possession Of Their Invention

The Examiner states that "A review of the specification finds an adequate written description of only a device where the microchannels and heating arrays have been synthesized in a silicon substrate ..." *Office Action pg 4*. The Applicants find this rejection based on the same argument as the alleged lack of enablement presented above. Consequently, the Applicants rely on the same rebuttal and claim clarifications presented above to traverse this rejection.

The Applicants, therefore, respectfully request the Examiner to withdraw the rejection.

III. The Silicon-Glass Embodiment

The Examiner admits that the housing portion of one of the Applicant's preferred embodiment incorporates silicon, glass and quartz:

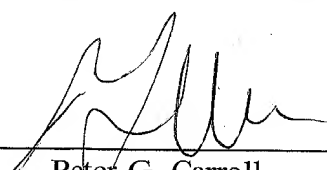
As presently worded, the invention of claims 1-20 has been interpreted as encompassing a device where the support does not have to be made of silicon, but can comprise materials such as glass and quartz. ... While Figure 2 does depict a device that comprises a glass substrate ... *Office Action*, pg 3 ¶ 5.

The Applicants, therefore provide a Markush group to Claim 13 (added as a new claim in the previous response) reciting these materials as possible housing materials.

CONCLUSION

The Applicant believes that the arguments and claim amendments set forth above traverse the Examiner's rejections and, therefore, request that all grounds for rejection be withdrawn for the reasons set above. Should the Examiner believe that a telephone interview would aid in the prosecution of this application, the Applicant encourages the Examiner to call the undersigned collect at 617.252.3353.

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APPENDIX I
MARKED-UP VERSION OF REWRITTEN CLAIMS
PURSUANT TO 37 CFR § 1.121 (c)(1)(ii)

1. (Twice Amended) A device comprising:
 - [i] a housing comprised of a substrate, said substrate selected from the group consisting of silicon, glass and quartz;]
 - [i]i) a [fluid] microdroplet transport channel in a silicon substrate, said channel connecting to a reaction region; and
 - [i]ii) a series of heating elements arrayed along said [fluid] microdroplet transport channel, wherein said series of heating elements are configured so as to provide differential heating.

5. (Amended) The device of Claim [4] 1, wherein said [substrate] microdroplet transport channel further comprises a first silicon oxide layer, a silicon nitride layer, and a second silicon oxide layer.

8. (Twice Amended) A system comprising:
 - i) a microdroplet;
 - ii) first and second microdroplet transport channels in a silicon substrate, said channels connecting to a reaction region[, said substrate selected from the group consisting of silicon, glass and quartz]; and
 - iii) a series of heating elements arrayed along said first and second transport channels, wherein said series of heating elements are configured so as to provide differential heating of said microdroplet by said heating elements.

13. (Amended) A device comprising:
 - i) a first housing portion comprising silicon;
 - ii) a [fluid] microdroplet transport channel in said first housing portion, said transport channel connecting to a reaction region;



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- iii) a second housing portion bonded to and aligned with said first housing portion thus creating an assembled housing, wherein said second housing portion is selected from the group consisting of silicon, quartz or glass; and
- iv) a series of heating elements in said assembled housing arrayed along said fluid transport channel, wherein said series of heating elements are configured so as to provide differential heating.